

DESCRIPTION OF A NEW GENUS AND SPECIES OF
PSEUDIONINAE (ISOPODA: BOPYRIDAE) PARASITE OF
THE HERMIT CRAB *PAGURUS ANNULIPES* (STIMPSON)
FROM NORTH CAROLINA

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Abstract.—Specimens of the entoniscid, *Paguritherium alatum* Reinhard and the bopyrids, *Stegophryxus hyptius* Thompson, *Asymmetrione desultor* Markham and *Pseudasymmetrione markhami* n. gen., sp. n. were collected from pagurid hermit crabs in inshore marine waters near Beaufort, North Carolina. *Pseudasymmetrione markhami* was found in the left branchial chamber of *Pagurus annulipes*. The new genus is most similar to *Shiinoela* Bourdon, *Pseudionella* Shiino, and *Asymmetrione* Codreanu, Codreanu and Pike but is differentiated by the following combination of characters: (1) female dorsal segmentation medially indistinct, (2) female frontal lamina without medial notch, (3) female with last 3 pairs of pleopods uniramous, (4) male cephalon and first segment fused medially, and (5) male without pleopods. The generic position of *Pseudionella pyriforma* Shiino, 1958 is questioned. The significance of the posterolateral projection of the maxilliped, here designated as the "maxilliped spur," and the interpretation of the presence or absence of pleopods on male bopyrids are briefly discussed.

From 1963-1970 approximately 550 specimens of *Pagurus* (250 *P. annulipes* and 300 *P. longicarpus*) from inshore marine waters near Beaufort, North Carolina, were examined for epicaridean isopod parasites by R. W. Heard and C. Kellogg. Four isopods, one a member of the family Entoniscidae and 3 belonging to the family Bopyridae, were collected during this study. The entoniscid, identified as *Paguritherium alatum* Reinhard, 1945, was found in 3 *Pagurus longicarpus* and 2 *P. annulipes*. The monotypic genus *Paguritherium* occurs in the body cavity of its pagurid host and has previously been reported only from the coast of Massachusetts in *Pagurus longicarpus* (see Reinhard, 1945, and Reinhard and Buckeridge, 1950). Its occurrence in *P. annulipes* in North Carolina thus represents new host and geographical records.

The 2 bopyrids, *Stegophryxus hyptius* Thompson, 1902 and *Asymmetrione desultor* Markham, 1975, were given to J. C. Markham and are the subjects of two earlier reports (Markham, 1974; 1975). Another species of the family Bopyridae which occurred in the left gill chamber of *P. annulipes*, is described here as a new genus and species.

Pseudasymmetrione gen. n.

Figs. 1-3

Diagnosis.—Female: Body asymmetrical, cephalon dextral to main body axis. Frontal lamina entire. Segmentation medially indistinct. Coxal plates and dorsal bosses present on at least first 4 pereomeres. Pleon of 6 distinct pleomeres. Pleopods 5 pairs; first 2 pairs biramous; last 3 pairs uniramous. Uropods uniramous.

Male: Body relatively wide (width over 50% length). Cephalon laterally distinct, medially fused with pereomere 1. Pleon of 6 distinct pleomeres. Pleopods reduced or absent. Uropods and midventral tubercles absent.

Type-species.—*Pseudasymmetrione markhami* sp. n.

Etymology.—From the Greek pseudo- in combination with the generic name *Asymmetrione*. The gender is feminine.

Comparison and discussion.—The differences between *Pseudasymmetrione* and related genera are summarized by the following combination of characters: (1) female dorsal segmentation medially indistinct; (2) frontal lamina of female without notch; (3) last 3 pairs of pleopods of female always uniramous; (4) male cephalon and first segment fused medially; and (5) pleopods of male apparently absent (although the low “flap-like” ridges extending medially from lateral margins of abdominal segments might be interpreted as vestigial pleopods).

Pseudasymmetrione appears to be most similar to *Shiionella* Bourdon, 1972, *Pseudionella* Shiino, 1949, and *Asymmetrione* Codreanu, Codreanu, and Pike, 1965. *Pseudionella* differs from *Pseudasymmetrione* by having (1) female dorsal segmentation distinct, (2) frontal lamina of female reduced or absent, (3) coxal plates of female reduced or absent, and (4) pleopods of male present and tuberculate. *Asymmetrione* differs from the new genus by having (1) female frontal lamina notched medially, (2) enlarged and characteristic pereopodal propodi of female, and (3) pleopods of female usually biramous with pleopods 1-3 always biramous. *Shiionoella* can be differentiated from *Pseudasymmetrione* by having (1) female with dorsal body segmentation distinct, (2) female with pereopods elongate with developed propodi and dactyli, (3) male with cephalon distinct from pereon, and (4) pleon of male with segments 4-6 medially indistinct.

There are some inconsistencies in the generic characters of *Pseudionella*. In Table 1 we have used morphological data only for the type-species *P. attenuata* Shiino, 1949, since the only other species in the genus, *P. pyriforma* Shiino, 1958, was described as having well-developed biramous pleopods on the female. Furthermore, even though Shiino's text indicates that a frontal lamina and coxal plates are absent on *P. pyriforma*, his illustration (p. 41) indicates the presence of these structures. The illustra-

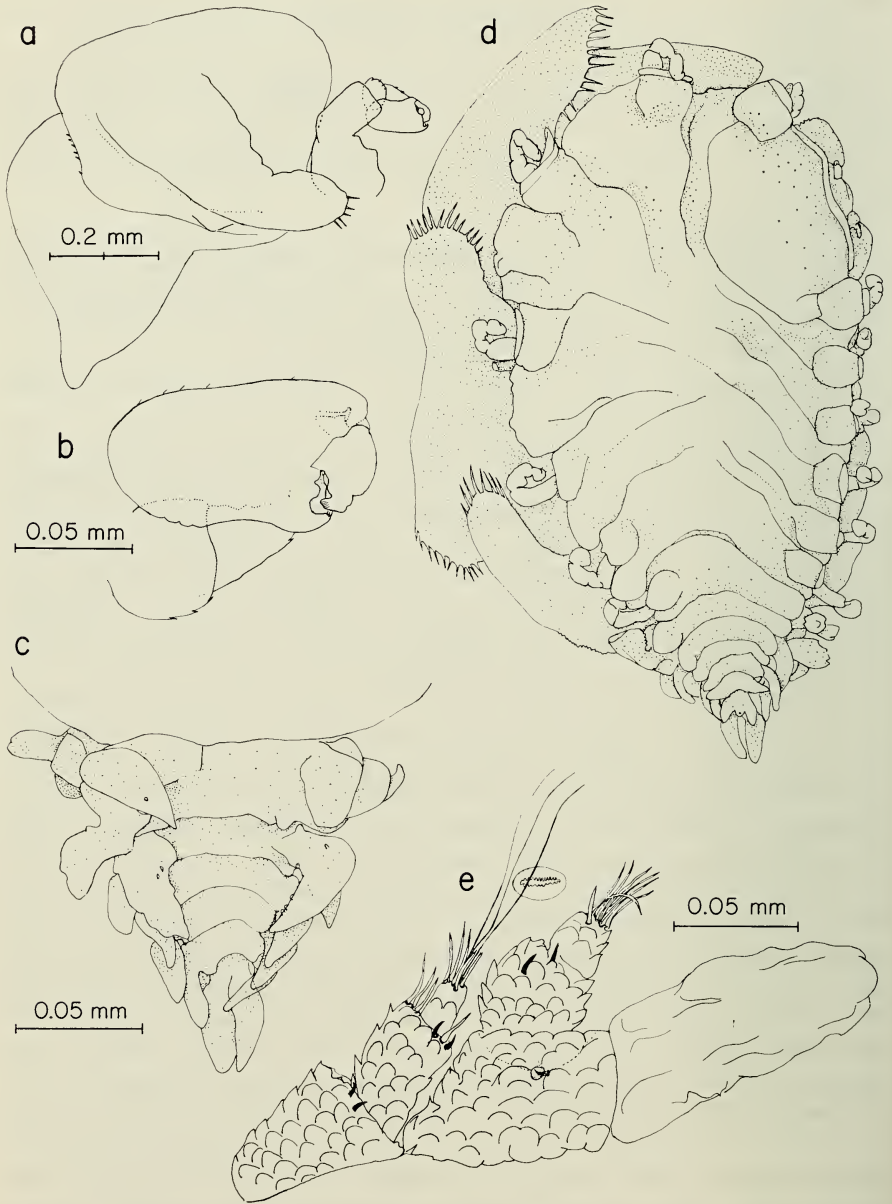


Fig. 1. *Pseudasymmetrione markhami*, female: a, Left oostegite 1, external view; b, Left pereopod 1; c, Pleon, ventral view; d, Holotype, dorsal view; e, Left antennae. Scales as indicated.

Table 1. Comparison of some genera of Pseudioninae.

	<i>Pseudasymmetrione</i>	<i>Pseudionella</i>	<i>Shiinoella</i>	<i>Asymmetrione</i>	<i>Parapseudione</i>	<i>Pseudione</i>
segmentation of ♀	medially indistinct	distinct	distinct	distinct	distinct	distinct
torsion	70° right	slightly left	slightly right	slightly left to 90° right	slightly left	slight, variable
frontal lamina	entire, reflexed	vestigial	entire, reflexed	notched, variable	none	present, variable
coxal plates	1-4	vestigial	1-4	present	1-4	1-4
dorsal bosses	1-4	1-4	1-4	most pereomeres	most pereomeres	most pereomeres
pleopods	1-2 biramous 3-5 uniramous	1-2 biramous 3-5 uniramous	1-2 biramous 3-5 uniramous	usually 1-5 biramous*	1-4 biramous 5 uniramous	1-5 biramous
uropods	uniramous	uniramous	uniramous	uniramous	uniramous	uniramous
♂ cephalon & 1st segment	fused	fused	distinct	distinct	distinct	distinct
pleon segmentation	distinct	distinct	4-6 medially fused	distinct	distinct	distinct
pleopods	absent (see discussion)	5 pairs tubercles	absent	5 pairs tubercles	absent	5 pairs tubercles
host group(s)	Paguridae	Paguridae	Alpheidae	Paguridae Diogenidae	Galatheidae Paguridae	Caridea Macrura Anomura
no. of species	1	2 (?)	1	7	2	49

* Shiino (1933) reported that in some female specimens of *Asymmetrione* (= *Pseudione*) *asymetrica* the fifth and sometimes fourth pairs of pleopods were uniramous.

tion of the type-species, *P. attenuata*, also shows what appears to be a weakly developed frontal lamina. It is our opinion that these 2 species are not congeneric and that *P. pyriforma* has closer affinities with the genus *Pseudione* Kossman; however, the fusion of the cephalon with the first pereonal segment in the male of *P. pyriforma* excludes it from the genus *Pseudione* as now defined. It would be premature, however, to assign *P. pyriforma* to an existing genus or to a new genus until the type material can be studied in more detail.

Pseudasymmetrione markhami, new species

Material examined.—Morehead Channel, Carteret County, North Carolina, R. W. Heard coll. and det. of host, 26 August 1963; 1♀, (holotype), 1♂ USNM 170590. 8 December 1963; 2, 2 (host present) USNM 170591. 15 January 1964; 1♀, 1♂ USNM 170592, 1♀, 1♂ collection of authors. 21? June 1965; 1♀, 1♂ collection of authors. 19 July 1965; 1♀, 1♂ Universitetets Zoologiske Museum, Copenhagen. 25 June 1970; 3♀, 3♂ USNM 170593, 1♀, 1♂ collection of authors.

Diagnosis.—Female: Body asymmetrical, distortion dextral and greater than 50%.

Cephalon deeply set into pleomere 1; frontal lamina entire, folded onto cephalon. Segments laterally distinct, medially indistinct. Coxal plates and dorsal bosses prominent on first 4 pereomeres.

Pleon of 6 distinct pleomeres. Pleopods 5 pairs; first biramous, endopod bilobed giving triramous appearance; second biramous; 3–5 uniramous. Uropods terminal, uniramous.

Male: Body width over 50% length, greatest width across third pereomere. Head fused medially with pereomere 1; all other segments distinctly narrower than pereon. Pleopods apparently absent. Uropods and midventral tubercles absent.

Description.—Female: (Based on 11 adult specimens) Body asymmetrical, distortion angle 55–80. Length 1.9–4.1 mm, width across third pereomere 1.3–2.4 mm.

Cephalon nearly quadrate, wider than long (length 75–85% width); deeply set in pereomere 1. Eyes apparent in some specimens. Frontal lamina entire (no medial notch), wider medially and folded onto dorsal surface of cephalon. First antenna (Fig. 1e) of 3 segments; basal segment 1–2 apical setae; second segment 4–6 apical setae, 1 subapical seta on some; distal segment 4–9 apical setae, 2–3 aesthetes as long as antenna. Second antenna (Fig. 1e) of 3 segments; basal segment 1 seta in pit; second segment 1 apical seta; distal segment, 6–11 apical setae. Antennae covered with scales and second subequal in length. Pore (excretory?) located anteriolateral to antennae (Fig. 1e). Maxilliped (Fig. 2a–e) covered with short setae along margins and dorsal surfaces, deeply notched in antero-internal

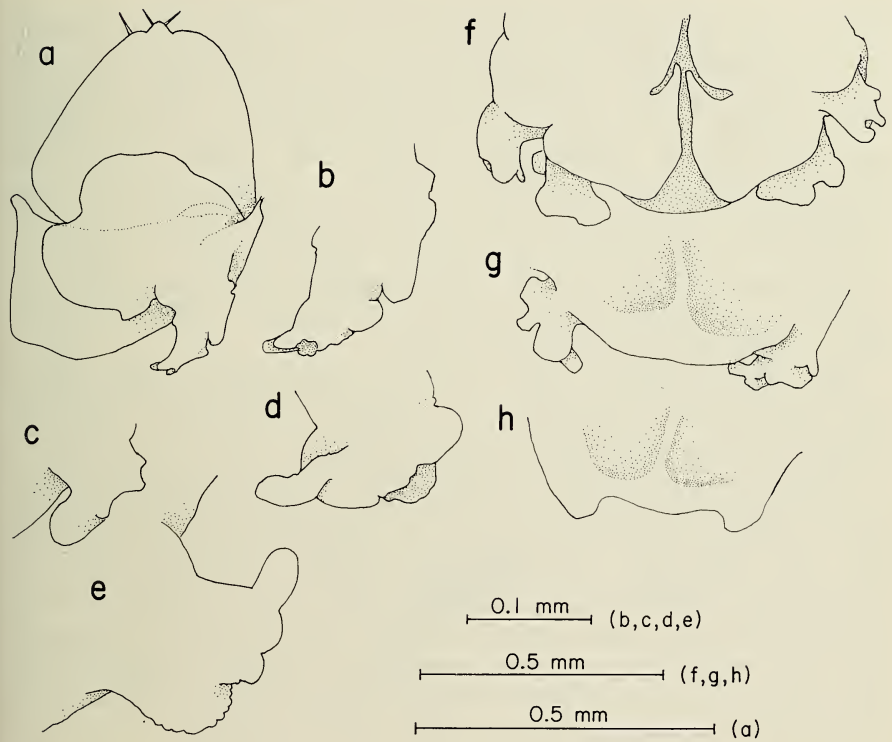


Fig. 2. *Pseudasymmetrione markhami*, female: a, Left maxilliped with spur; b, Enlargement maxilliped spur; c, Left maxilliped spur; d, Right maxilliped spur, same female as c; e, Left maxilliped spur; f, Maxilliped, spur and posterior lamina; g, Posterior lamina; h, Posterior lamina. Scales as indicated.

angle; palp vestigial, provided with several long setae; maxillular plates interlocking opposite antero-internal angle; maxillular spur (see discussion) anterior to interlocking area of plates, origin at lateral muscle attachment area, extending past posterior ventral border of head (Fig. 2a-e). Posterior lamina of cephalon 1 pair of lobes (Fig. 2f-h).

Pereon of 7 laterally distinct segments; medial segmentation generally indistinct on pereomeres 3-6 though in some specimens segmentation of pereomeres 1-3 also indistinct. Dorsal bosses present on all segments, less distinct in pereomeres 4-7. Coxal plates prominent on first 4 pereomeres. Tergal area not greatly developed. Oostegite 1 rectangular, prominent posterolateral point, internal ridge unornamented (Fig. 1a). Oostegites right side elongate; left side nearly square. Pereopods covered with scales; similar in form, increasing in size posteriorly.

Pleon (Fig. 1c) of 6 segments; length of pleon subequal to width of

pleomere 1. Lateral plates small and bluntly rounded; lateral plates on pleomere 6 prominent and directed posteriorly. Pleopods; 5 pairs, decreasing in size posteriorly; first biramous, exopod reduced, endopod bilobed, external lobe lanceolate and folded posteriorly back onto itself, medial lobe reduced, smaller than exopod. Second pleopod biramous; exopod smaller than first; endopod weakly bilobed, internal lobe vestigial, external lobe lanceolate. Pleopods 3-5 uniramous, lanceolate. Uropods uniramous, longer than pleopod 3, slight expansion on basal internal edge (vestigial endopod?).

Variation: Pereomeres 6 and 7 show variation in the development of dorsal bosses and coxal plates; lateral plates, though small, present on 2 specimens (2.3 and 2.5 mm); dorsal bosses were absent. A 2.0 mm specimen had a vestigial endopod on the left uropod.

Male: Body relatively wide (width over 50% length), length 0.8-1.5 mm, width 0.5-0.8 at pereomere 3 or 4. Cephalon and pereomere 7 approximately of equal width, cephalon slightly broader.

Cephalon fused medially with pereomere 1, other segments distinct. Frontal margin broad, concave medially. Eyes apparent only in fresh material. First antenna, 3 segments; basal segment, no apical or subapical setae, lobe near base, 2-3 setae; second segment, 2-6 apical setae, 0-3 subapical setae; distal segment, 9-11 apical setae, no subapical setae. Second antenna, 5 segments; basal segment, no setae; second segment, 0-2 subapical setae; third segment, 3 or 4 apical setae; fourth segment, 3-6 apical setae; distal segment; 6-10 apical setae. Both antennae covered with scales, second antenna less than twice length of first (Fig. 3d).

Pereomeres ending in wide blunted point, pereomeres 5-7 bent increasingly posteriorly, seventh broadly V-shaped. Pereopods (Fig. 3a-c) similar in size and structure, seventh smallest.

Pleon (Fig. 3f) 6 pleomeres, distinctly narrowing posteriorly; sixth pleomere 25-50% width of first. Pleopods absent though flap-like ridges present (not visible in lateral view). Pleomere 6 slightly lobed posteriorly with scales occurring on lateral and posterior regions and 3-11 setae laterally. Uropods absent. Anal cone indistinct.

Variation: One specimen (1.5 mm) has a length to width ratio of 0.39. Other variation is minor.

Type-locality.—Morehead Channel, Carteret County, North Carolina. Depth, 2-5 meters. Bottom type, shell rubble. Salinity, 25-36‰.

Habitat.—Left branchial chamber of *Pagurus annulipes* (Stimpson, 1860).

Characteristic associated fauna.—*Corophium tuberculatum* Shoemaker, *Hexapanopeus angustifrons* (Benedict and Rathbun), *Paguristes hummi* Wass, *Pagurus pollicaris* Say, and *Trachypenaeus constrictus* (Stimpson).

Etymology.—This species is named for John C. Markham in recognition of his work on the taxonomy and systematics of bopyrid isopods.

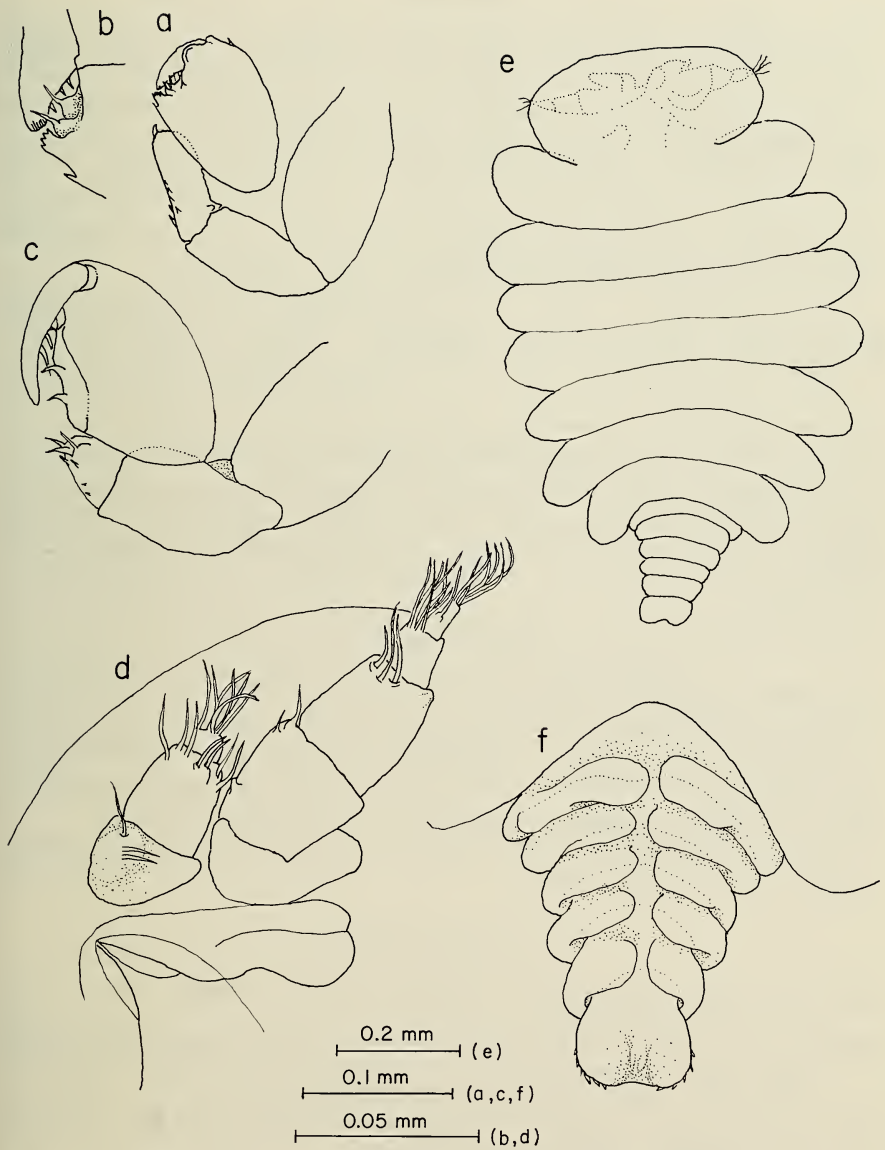


Fig. 3. *Pseudasmmetrione markhami*, male: a, Left pereopod 1; b, Enlargement of a; c, Left pereopod 7; d, Left antennae; e, Dorsal view; f, Pleon, ventral view. Scales as indicated.

Discussion

The maxilliped spur (Fig. 2a-e) is here defined as a posterior lateral projection from the muscle attachment area of the maxilliped. In *Pseudasymmetrione markhami*, the spur is clearly attached to the maxilliped and not to the cephalon. Various authors (Chopra, 1923; Richardson, 1905; Sars, 1898; and Shiino, 1950) have illustrated an anterior projection of the posterior lamina attached to the maxilliped. This projection could, in fact, be a maxilliped spur, but only Chopra (1923, pl. 12, 13, 15) mentioned that part of the posterior lamina was attached to the maxilliped.

Because pleopods of males of the Pseudioninae vary from biramous (*Propseudione* Shiino, 1933), to uniramous (*Pseudione* Kossman, 1881), to absent (*Aporobopyrus* Nobile, 1906); the question of when a swelling or tubercle on the ventral surface of the pleon should be considered a pleopod needs to be answered. *Pseudasymmetrione markhami* males do not have pleopods even though the positions of the pleopods are indicated by low flap-like ridges extending medially from the lateral margins of the pleomere (Fig. 3f). These ridges are not visible in lateral view. We suggest that a pleopod should be visible as a protuberance in lateral view of the pleon.

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Note added in proof.—Markham (1978:110) mentions an “undescribed genus and species.” Examination of his material from *Iridopagurus iris* shows that the specimens are assignable to *Pseudasymmetrione* but appear to represent an undescribed species. The female differs from the female of *P. markhami* by its dextral torsion and by the shape of the maxilliped and the first oostegite. Markham’s male specimen of the undescribed species assignable to *Pseudasymmetrione* differs only slightly from *P. markhami* in that the ventral ridges of the pleon are more distinct.

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